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ORIGINAL ARTICLE

The Shoulder Disability Questionnaire differentiated well between high and low disability levels in patients in primary care, in a cross-sectional study

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Abstract

Objectives: To investigate the usefulness of the Shoulder Disability Questionnaire (SDQ) for cross-sectional discriminative purposes, we assessed the discriminative ability of items, internal consistency, content validity, and construct validity.

Study Design and Setting: Two hundred patients recruited in primary and secondary care identified their chief functional limitations, scored their shoulder pain, and completed the SDQ. Two physical therapists assessed the range of motion, muscle force, and scored the severity of disability.

Results: Comparison of the chief functional limitations of the patients with the SDQ items confirmed the content validity of the SDQ. Cronbach's α describing the internal consistency was 0.79. Construct validity was confirmed for patients with different levels of pain, range of active abduction, muscle force, ability to perform activities in daily life, and the severity of disability scored by the physical therapists. However, the differences in the SDQ-score between extreme groups were less evident in the secondary care population. In patients in the secondary care rheumatology clinic, the discriminative ability of most SDQ items was very limited.

Conclusion: The presented results suggest that the SDQ appears to be a useful discriminative instrument, especially in the primary care setting. © 2007 Elsevier Inc. All rights reserved.

Keywords: Shoulder; Shoulder Disability Questionnaire; Health status assessment; Disability evaluation; Validity; Cross-sectional discrimination

1. Introduction

Patients with shoulder complaints suffer from pain, restricted range of motion, or decreased muscle force. As a consequence patients may have difficulties or be unable to perform various activities of daily living such as self-care activities, housekeeping, work, and recreational activities [1–4]. Several questionnaires and scoring systems have been designed to assess shoulder function [5–17] covering different domains and assessment techniques, which have been evaluated in different groups of patients.

The Shoulder Disability Questionnaire (SDQ) was developed with the primary goal to measure change over time in pain-related disability among patients with shoulder complaints [15]. Therefore, the construction of this questionnaire and subsequent validation was directed to this purpose. Items included in the SDQ are considered to be sensitive for detecting clinically relevant changes in the disability of patients with shoulder complaints by Dutch physical therapists and by Dutch experts in the field of shoulder research. Subsequently, the responsiveness of this questionnaire was evaluated in a group of patients participating in a randomized clinical trial [15,18] and within an observational study [16]. Both studies were conducted in a primary care setting and showed satisfactory responsiveness emphasizing the usefulness of the SDQ in longitudinal studies.

It is unclear whether the SDQ is also applicable in studies with the purpose to measure cross-sectional differences

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in severity of disability among patients with shoulder complaints. It has been emphasized that for the evaluation of questionnaires it is important to distinguish between discriminative, evaluative, and predictive purposes [19,20]. For all these purposes, it is important that the individual items of a questionnaire reflect situations that are relevant to most patients. For discriminative purposes the individual items should have the ability to discriminate between patients with different levels of disability. Furthermore, the score on the questionnaire should be related to other measures in a manner that is consistent with theoretically derived hypotheses concerning the measurement of pain-related disability (construct validity).

The objective of this study was to evaluate whether the SDQ is a useful instrument to identify cross-sectional differences in severity of shoulder disability. To answer this question the discriminative ability of individual items, the internal consistency, the content validity, and the construct validity of the SDQ was assessed.

2. Methods

2.1. Patients

To compose a sample of patients with different levels of severity of shoulder complaints, patients were recruited at different health care settings with only few exclusion criteria. Twenty general practitioners, 2 physicians working in an orthopedic practice, and 20 secondary care rheumatologists encouraged all consecutive patients with a first or subsequent consultation for shoulder complaints to participate in this cross-sectional study. Patients were eligible for participation if they were between 18 and 75 years of age, were sufficiently competent to complete questionnaires on their own (e.g., no dementia), and gave informed consent. Patients with shoulder complaints due to neurological, vascular, or internal disorders, systematic rheumatic diseases, fractures, or dislocations were excluded from participation.

2.2. Shoulder Disability Questionnaire

The SDQ is a pain-related disability questionnaire, which contains 16 items referring to situations that might be associated with functional limitations for patients with shoulder complaints. All items refer to the preceding 24 hours. Response options are “yes,” “no,” or “not applicable”. The response option “not applicable” should be chosen when the situation at issue has not occurred during the past 24 hours. The patients completed the questionnaire after a short explanation of the response options. The translated version of the SDQ with the patient instructions and the items are listed in the appendix of a previous article [15]. The final SDQ-score was calculated by dividing the number of positive responses by the total number of applicable items, and multiplying this score by 100.

Consequently, the SDQ-score can range from 0 to 100 with a higher score indicating more severe disability.

2.3. Measurements

Within the framework of a study on interobserver agreement on the diagnosis of shoulder disorders, which involved history taking and physical examination [21–23], the SDQ was evaluated. During history taking, demographic characteristics (age and gender) and clinical characteristics (e.g., duration of complaints, sleep disturbances, and the ability to perform daily activities) were recorded. Physical examination was performed independently by two experienced physical therapists and consisted of the assessment of the range of motion and muscle force of the shoulder. For active abduction and passive abduction, external rotation, and adduction, the range of motion was estimated by visual assessment, and recorded in degrees (with increments of 5°). Muscle force was examined during manual isometric resistance tests for abduction, adduction, external and internal rotation of the shoulder, and flexion and extension of the elbow. The degree of muscle weakness was estimated and recorded (none, moderate, or severe). No weakness: comparable force of the affected and contralateral side; moderate weakness: small to moderate differences between the sides; and severe weakness: unable to withstand the force. If the muscle performance was mainly hampered due to pain, this was recorded. Based on history taking and physical examination, both examiners independently estimated the severity of disability on a 100 mm Visual Analog Scale (VAS) ranging from 0 “no disability” to 100 “very severe disability.”

All patients were asked to identify three activities, which they considered to be the most relevant and important functional limitations in daily life and they were asked to state which activity they considered to be the main functional limitation [24]. The severity of the functional limitation was rated on a VAS ranging from 0 “no disability” to 100 “very severe disability.” Furthermore, the patients recorded the severity of their pain, both at night and during the day in the preceding week on a VAS ranging from 0 “no pain” to 100 “very severe pain.” Personality traits (anxiety, anger, depression, and optimism) were measured by means of the Self-Assessment Questionnaire Nijmegen (SAQ-N) [25–28]. The examiners were blinded for the results of assessments by the patients.

2.4. Discriminative ability

To distinguish between patients with different levels of disability, the individual items of the SDQ should have discriminative ability. Items with similar responses by most patients do not contribute to the discriminative power of the questionnaire. For each individual item of the SDQ, the number and percentage of positively answered items, missing values, and “not applicable” were assessed. The

percentage of positively answered items was also assessed for the subgroups of patients recruited in the primary and secondary care settings. Acceptable discriminative ability was defined before analyzing the data as a percentage of positive responses between 20 and 80 because items with a low (or high) percentage of positive responses may contribute insufficiently to the assessment of cross-sectional differences in the severity of shoulder disability [29]. Patients with three or more missing values in their SDQ-questionnaire were excluded from further analyses. Subsequently, the items were ranked according to the percentage of positive responses. Furthermore, the usefulness of individual items was evaluated by studying whether the internal consistency of the SDQ increased substantially after excluding individual items one at a time. The internal consistency of the SDQ was assessed by calculating Cronbach's alpha (α), which was considered to be acceptable when α exceeds 0.7 and is lower than 0.9 [29].

2.5. Content validity

Content validity refers to the extent to which an instrument covers the most important aspects of the concept that it is meant to represent [19,29]. The SDQ consists of items that were considered to be crucial in the evaluation of treatment outcome by 273 physical therapists and 47 researchers in the field of shoulder disorders [15]. Whether the SDQ also contains important items for patients was studied by comparing the items included in the SDQ with the individual functional limitations most frequently mentioned by the patients.

The functional limitations mentioned by the patients (maximal 3 per patient) were ranked according to the percentage of which they were mentioned. To assess the content validity of the SDQ the rank order of the identified functional limitations by the patients were compared with the rank order of the items of the SDQ. Spearman's rank correlation coefficient was calculated to evaluate the content validity.

2.6. Construct validity

Construct validity refers to the extent to which a particular measure is related to other measures in a manner that is consistent with theoretically derived hypotheses concerning the constructs that are measured [19,29]. Firstly, construct validation by extreme groups was established by evaluating whether the SDQ-scores significantly ($P < 0.05$) differ between subgroups with a clearly different level of disability. Secondly, convergent validity was determined by assessing to which extent the SDQ-score is correlated to variables that measure more or less the same construct. Thirdly, divergent validity refers to the extent to which the SDQ-score is not correlated to variables that measure different constructs. Before examining our data we formulated various hypotheses to assess the construct validity.

2.6.1. Extreme groups

It was hypothesized that: (1) patients with a high pain severity during the day (VAS score above the 75th percentile) would have a higher SDQ-score than patients with a low pain severity (VAS score below the 25th percentile), (2) the SDQ-score will be higher for patients who stated during history taking that they are unable to perform the daily activities compared to patients who are still able to perform their daily activities, (3) patients with an active abduction of less than 90° would have a higher SDQ-score than patients with an active abduction of more than 160° (using the mean of both examiners), (4) patients with moderate or severe muscle weakness recorded at least for three out of six tests by both examiners would have a higher SDQ-score than patients with no muscle weakness at all tests according to both examiners. Furthermore, it was expected that (5) patients with a high level of disability estimated by the physical therapists (mean VAS score above the 75th percentile) would have a higher SDQ-score than patients with a low level of disability (mean VAS score below the 25th percentile).

For descriptive purposes, the median SDQ-score and the interquartile range were calculated for the different subgroups. Construct validity by extreme groups was regarded as confirmed when the Mann–Whitney test showed statistically significant differences ($P < 0.05$) between groups.

2.6.2. Convergent validity

It was expected that the SDQ-score would be correlated to: (6) the level of disability estimated by the physical therapists using the mean score of both examiners on a VAS, (7) the degree of restricted range of motion for the different movements using the mean score of both examiners, (8) the degree of difficulty for the main functional limitation scored by the patient, and (9) the severity of pain at night and during the day assessed by the patients.

Convergent validity was regarded to be acceptable when the calculated Spearman's rank correlation coefficient was 0.5 (using the absolute value of the correlation coefficient) or higher [7,8].

2.6.3. Divergent validity

It was hypothesized that the SDQ-score will not be correlated with: (10) the score on the SAQ-N measuring personality traits such as depression, anxiety, anger, and optimism. Furthermore, no differences in the SDQ-score were expected for (11) male and female patients.

Divergent validity was regarded to be acceptable when the Spearman's rank correlation coefficient was 0.3 (using the absolute value of the correlation coefficient) or lower [7,8]. Furthermore, no significant differences ($P < 0.05$) should be found for the Mann–Whitney test.

3. Results

Of 201 patients recruited for the study, 1 patient was excluded from further analysis because the SDQ questionnaire contained 5 missing values. The characteristics of the study population are presented in Table 1. Patients recruited in the secondary care rheumatologic clinic experienced more severe shoulder complaints than patients recruited in the primary care setting, mentioning more frequently pain at rest and inability to perform daily activities. Furthermore, the patients in the secondary care setting had higher pain severity and higher SDQ-scores. It is noteworthy that those patients also had higher scores for depression, anxiety, and anger and lower scores for optimism.

The results for the assessment of the discriminative ability of items and content validity are presented in Table 2. The questionnaires were completed with only a few missing values ($n = 15$); 93% of the questionnaires were without missing values. Of all items, items 7, 8, 9, and 11 were scored most frequently as not applicable: lifting and carrying (11%), opening and closing a door (12%), holding the wheel of a car or the handlebars of a bike (24%), and writing or typing (26%).

In Table 2 the items of the SDQ are ranked according to the percentage of positive responses for all patients. With

respect to the percentage of positive responses for the whole population unacceptable discriminative ability was found for four items. However, this was shown to be dependent on the health care setting. The percentage of positive responses was clearly higher for the patients recruited in the secondary care rheumatologic clinic (eight items had unacceptable discriminative ability), whereas for the other two settings only three items were not of acceptable discriminative ability. When the items were ranked according to their percentage of positive responses the results of the three settings were similar and this was confirmed by the high Spearman's rank correlation coefficients (0.92–0.99). Lying on the involved shoulder (item 2), reaching or grasping above shoulder level (item 10), movements of the arm (item 5), and putting on a coat or sweater (item 3) were most frequently chosen. The calculated Cronbach's alpha was 0.79 for the SDQ questionnaire. Omitting one item at a time showed that the internal consistency (α) did not increase when individual items were left out (α values ranged from 0.77 to 0.79).

To assess the content validity, the individual most relevant functional limitations mentioned by the patients were compared with the items of the SDQ. Most items of the SDQ were also mentioned as important functional limitations by the patients. However, patients described some

Table 1
Characteristics of the study population

	General practice ($n = 75$)	Orthopedic practice ($n = 33$)	Secondary care rheumatology clinic ($n = 92$)	Total ($n = 200$)
Female (%)	61	52	69	66
Mean age in yr (SD)	44 (13)	49 (11)	50 (11)	47 (12)
Dominant shoulder affected (%)	57	67	43	54
Bilateral shoulder problems (%)	21	6	38	27
Previous episode(s) of shoulder complaints (%)	40	30	43	40
Duration of current episode (%)				
<3 mo	45	9	18	26
3–6 mo	13	12	20	16
6–12 mo	19	27	22	21
>12 mo	23	52	40	34
Pain at rest (%)	63	58	73	67
Severity of pain ^a (median, IQR)				
At night	59 (23, 82)	25 (9, 57)	55 (31, 76)	54 (30, 77)
During the day	58 (31, 77)	35 (20, 69)	63 (41, 72)	56 (31, 75)
Unable to perform daily activities (%)	31	24	52	40
SDQ-score (median, IQR)	67 (45, 86)	64 (42, 77)	76 (65, 91)	69 (54, 87)
Main functional limitation ^b (median, IQR)	72 (54, 87)	66 (49, 84)	71 (56, 84)	71 (54, 85)
Personality traits (median, IQR)				
Depression	33 (30, 39)	32 (27, 38)	38 (34, 44)	35 (31, 41)
Anxiety	32 (29, 43)	30 (26, 37)	41 (33, 50)	35 (29, 47)
Anger	16 (13, 20)	17 (13, 19)	19 (15, 22)	18 (13, 20)
Optimism	25 (22, 28)	26 (24, 29)	23 (20, 26)	24 (21, 27)

Abbreviations: SDQ, Shoulder Disability Questionnaire; IQR, interquartile range; SD, standard deviation; VAS, visual analog scale.

^a Severity of pain assessed by patients on a VAS (range 0–100).

^b Difficulty with the selected main functional limitation assessed by patients on a VAS (range 0–100).

Table 2

Discriminative ability and content validity

SDQ		Percentage of positively answered questions of the SDQ				Individual most relevant functional limitations mentioned by the patients	
Rank ^a	Item (item number in the questionnaire)	All patients (n = 200)	General practice (n = 75)	Orthopedic practice (n = 33)	Secondary care rheumatology clinic (n = 92)	Item	%
1	Lying on the involved shoulder (2)	88	84	88	91	Sleep disturbances	50
2	Reaching above shoulder level (10)	85	79	82	91	Housekeeping	27
3	Movements of the arm (5)	82	84	70	86	Carrying and lifting	24
4	Putting on a coat or sweater (3)	81	73	76	88	To (un)dress	19
5	Daily activities (4)	78	74	67	85	Sport activities	17
6	Lifting or carrying (9)	77	71	67	85	Lying on the involved shoulder	11
7	Rubbing of the painful shoulder (15)	72	63	70	81	Pain on unexpected movements	11
8	Wake up at night (1)	71	69	52	78	Movements above shoulder level	10
9	Moving to the back of the head (14)	68	59	52	81	Work	10
10	Moving to the lower back (13)	62	58	64	65	Car driving	9
11	Leaning on the elbow or hand (6)	53	53	33	60	Washing the body	8
12	Moving to the buttocks (12)	49	45	49	53	Combing or washing hair, shaving	7
13	Holding a wheel or handlebars (8)	44	37	46	48	Writing or typing	7
14	Opening or closing a door (11)	34	28	36	39	Child care	6
15	More irritable and bad tempered (16)	29	19	21	40	Movements to the side and backwards	6
16	Writing or typing (7)	23	27	19	21	Doing needlework	3

Abbreviations: SDQ, Shoulder Disability Questionnaire.

^a The items of the SDQ are ranked according to the percentage of positive responses for all patients.

activities more specifically, such as washing the body or washing hair. Those activities are covered by items 12–14 of the SDQ in a more general way. Leaning on the elbow or hand (item 6) and opening and closing a door (item 11) were not mentioned as important functional limitations by

the patients. Because the patients were asked to identify activities in daily life associated with limitation, it is not surprising that rubbing of the painful shoulder (item 15) and irritability (item 16) were also not mentioned. Spearman's rank correlation coefficient was 0.57.

Table 3

Results for the construct validation by extreme groups

	SDQ-score		SDQ-score restricted to patients recruited by general practitioners		SDQ-score restricted to patients recruited in a secondary care rheumatology clinic	
	Median (IQR)	Number of patients included in the analysis	Median (IQR)	Number of patients included in the analysis	Median (IQR)	Number of patients included in the analysis
Low pain severity (VAS-score <31) ^a	45 (30, 67)	50	38 (15, 59)	20	64 (33, 81)	15
High pain severity (VAS-score >75) ^a	79 (68, 93)	50	77 (63, 93)	25	83 (72, 98)	20
Able to perform daily activities	67 (48, 81)	121	60 (39, 74)	52	74 (60, 87)	44
Unable to perform daily activities	80 (69, 93)	78	86 (69, 93)	23	78 (69, 93)	47
Active abduction >160°	67 (45, 77)	102	60 (38, 71)	43	69 (57, 85)	40
Active abduction <90°	89 (75, 98)	32	90 (77, 100)	8	88 (69, 94)	23
No muscle weakness ^b	60 (35, 72)	57	53 (16, 64)	21	69 (57, 83)	21
Moderate to severe muscle weakness ^c	87 (74, 97)	33	85 (63, 93)	15	88 (78, 100)	18
Low level of disability (VAS-score <31) ^d	53 (31, 67)	49	41 (15, 58)	20	60 (48, 75)	13
High level of disability (VAS-score >76) ^d	88 (75, 94)	49	87 (77, 94)	16	88 (75, 98)	28

Notes: Subgroup analysis was not performed for the patients recruited in the orthopedic practice because of the small number of patients.

Abbreviations: SDQ, Shoulder Disability Questionnaire; IQR, interquartile range; VAS, visual analog scale.

^a Severity of pain assessed by the patient. The 25th and 75th percentiles were used to form extreme groups.^b Patients with no muscle weakness at all resistance tests according to both examiners.^c Patients with moderate or severe muscle weakness at least for three out of six tests according to both examiners.^d Severity of disability assessed by both examiners. The 25th and 75th percentiles were used to form extreme groups.

In Table 3 the results of the construct validity by extreme groups are presented. Significant differences in the SDQ-scores ($P < 0.001$) were found for subgroups with different pain severity, ability to perform activities in daily life, mobility, muscle force, and levels of disability according to the physical therapists. These data confirm all the hypotheses concerning the extreme groups. Comparing the results of the construct validity for the primary and secondary care population, the differences in the median SDQ-score between extreme groups were smaller in the secondary care population. The smaller differences can be explained by the fact that for the subgroup of patients with low severity of complaints, the SDQ-score was consistently higher in the secondary care population than in the primary care population.

Table 4 summarizes the results of the convergent and divergent validity. Acceptable convergent validity was found for the severity of disability assessed by both examiners ($r = 0.58$). Especially for the assessment of a range of motion of external rotation and adduction, the correlation was low -0.29 and -0.27 , respectively. In contrast to our prior expectations, the correlation between the severity of the main functional limitation and the SDQ-score was also low ($r = 0.32$).

For the assessment of divergent validity, it was expected to find a low correlation between personality traits and the SDQ-score. This was only confirmed for anger and

optimism. As hypothesized, no significant differences were found in the SDQ-score for female and male patients ($P = 0.19$).

4. Discussion

The SDQ is presently used in research and clinical practice in several countries. Our aim was to evaluate the usefulness of the SDQ for the purpose of measuring cross-sectional differences.

The items of the SDQ address common activities or problems that patients with shoulder complaints might experience. Most items included in the SDQ cover functional limitations that are considered to be relevant by the patients from different health care settings. Although in a recent systematic review, evaluating the clinimetric quality of SDQs, the content validity of the SDQ was rated as doubtful [17], our results provide supportive evidence for the content validity of the SDQ. However, compared to the description of the functional limitations by patients, for some SDQ items a more general wording is used. A clear advantage of a more general wording is that it prevents a high number of “not applicable” responses. Difficulties or even bias in responding might occur when functional status questionnaires contain too specific questions [7,11].

The distribution of positive responses showed a high similarity across the different settings, indicating that the SDQ is a robust instrument for different settings. However, the discriminative ability of individual items was shown to be dependent on the health care setting. The discriminative ability was not acceptable for three items of the SDQ for the primary care population, whereas the percentage of positive responses was high for the secondary care population (eight items were between 81% and 91%). The response options of the SDQ “yes,” “no,” or “not applicable” were chosen to facilitate uniform interpretation. However, even when the shoulder is only slightly painful during an activity, the response option “yes” should be chosen. For the secondary care setting, more refined response options might be a beneficial strategy to improve the discriminative ability of items. This seems preferable to further item-reduction, because the content validity of the SDQ seems to be acceptable and the internal consistency did not improve when excluding individual items. A consequence of introducing more refined response options would be that the properties of the SDQ have to be reestablished.

As expected, the SDQ was capable of detecting differences between patients with clearly different levels of severity of shoulder complaints, which is the minimum prerequisite for construct validity. However, the ability to detect differences in extreme groups seems to be less optimal in the secondary care population. The convergent validity was confirmed for only one hypothesis. The SDQ shows a relevant correlation with the judgment of the severity of disability by physical therapists based on history taking and physical examination. Divergent validity was

Table 4
Convergent and divergent validity

Variables	Spearman rank correlation with the SDQ-score
<i>Convergent validity</i>	
Severity of disability ^a	0.58
Range of motion ^b	
Active abduction	−0.40
Passive abduction	−0.41
Glenohumeral abduction	−0.33
External rotation	−0.29
Adduction	−0.27
Degree of difficulty for the main functional limitation	0.32
Severity of pain ^c	
At night	0.41
During the day	0.45
<i>Divergent validity</i>	
Personality traits	
Depression	0.39
Anxiety	0.38
Anger	0.23
Optimism	−0.21

Abbreviations: SDQ, Shoulder Disability Questionnaire; VAS, visual analog scale.

^a Mean severity of disability of both examiners on a VAS.

^b Reported results relate to the range of motion of the affected side. For bilateral shoulder problems, the side with the most severe problems was used in the analysis; results are based on the mean of both examiners.

^c Severity of pain assessed by patients on a VAS.

confirmed for the factor gender, but not for personality traits depression and anxiety.

To assess the convergent and divergent validity, we applied criteria that have been used in previous studies to test the construct validity of functional status questionnaires for the shoulder [7,8]. How to interpret the fact that for some hypotheses the correlations were not above 0.5 or below 0.3? Should we doubt the ability of the SDQ to discriminate between patients with different levels of disability or are there alternative explanations?

Although some correlations were not above the criterion of 0.5, the pattern of our correlations seems to be reasonable. Stronger correlations can be expected for more related measures. For example, different functional status questionnaires have shown to correlate highly [10,30]. The SDQ contains different kind of activities and the aggregated SDQ-score will be related to different problems associated with shoulder complaints such as movement restriction, loss of muscle force, pain, and psychosocial factors. Therefore, it is not surprising that the assessed disability by the examiners based on history taking and physical examination related most closely to the SDQ-score ($r = 0.58$).

The correlations for a range of motion were lower than expected. In the literature, observer variation in the measurement of a range of motion of the shoulder is identified as a common problem even with advanced systems such as the electromagnetic movement sensor [30]. We expected observer variation when judgments are made with increments of 5°. In our study, the percentage of agreement within 10° varied between 49% and 76% for the range of motion of the affected side [31]. Although using the mean scores of two examiners will prevent impact of observer variation, the observer variation might explain the low correlation found.

Furthermore, correlation between clinical findings obtained during physical examination, on one hand, and functional status questionnaires, on the other, is often only moderate to poor [10,32]. Triffitt [33], who studied the relationship between the ability of patients to perform activities in daily living and range of motion, showed that the correlation coefficient for different movements depended strongly on the type of activity performed. The highest correlations were found for combing the hair and washing the back. The ability to sleep on the affected side showed a low correlation with range of motion. Furthermore, external rotation correlated poorly with the various activities. Considering the fact that the SDQ contains a large number of items, which might only be weakly correlated to range of motion, the correlation with range of motion should be lower than the assessed disability by examiners which is based on different clinical symptoms.

A decreased level of functional ability can be associated with increased feelings of anxiety and depression [34]. The scores on the personality traits were expected to be unrelated to the SDQ-scores because the questionnaire should measure personality traits that are assumed to be relatively

stable over time in contrast with personality states and should therefore show no relation with disease severity. It is the question whether our theory might be wrong or the validity of the measurement of personality traits can be doubted, as a higher correlation than expected was found for depression and anxiety. This finding deserves more attention in future research.

Functional status questionnaires have the advantage that they are easy to administer in different populations and different situations. Several questionnaires have been published [6–11]. In the absence of a gold standard, validation of a functional status questionnaire is an ongoing process. It is difficult to determine which questionnaire would be most desirable to identify cross-sectional differences, because the questionnaires were developed in different countries and were evaluated in different patient populations. More comparative studies are needed to determine the usefulness of different questionnaires.

In this study, we assessed the usefulness of the SDQ for cross-sectional discriminative purposes in a sample of 200 patients recruited in primary and secondary care, irrespective of individual differences in sociodemographic or psychological variables. Several studies have shown that in different musculoskeletal conditions (self-reported) disability is associated with psychological distress or depressed mood [35–38], somatization [36], and sociodemographic factors such as level of education [35,39–42] or lifestyle factors [35,42]. Therefore, other factors such as psychological aspects and sociodemographic variables may have an impact on the within person variation (over time) and between person variation (cross-sectional) for the outcome of the SDQ. Whether the response to the SDQ depends on psychological or sociodemographic variables remains to be shown in future studies.

In conclusion, especially in the primary care population, the SDQ appears to be a useful instrument for the purpose of discrimination between different levels of disability. Future research should demonstrate whether the measurement of cross-sectional differences might be optimized when the SDQ has more detailed response options, especially in secondary care populations.

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